

FORM PTO-1390 (REV. 9-2001)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER 16791-2	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				U.S. APPLICATION NO. (If known, see 37 CFR 1.5)	
				10/070300	
INTERNATIONAL APPLICATION NO. PCT/IB00/01246		INTERNATIONAL FILING DATE 4 September 2000		PRIORITY DATE CLAIMED 8 September 1999	
TITLE OF INVENTION PROCEDURE AND DEVICE OF COOLING BY ABSORPTION					
APPLICANT(S) FOR DO/EO/US Vitale BRUZZO					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<p>1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.</p> <p>4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31).</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p>a. <input checked="" type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input type="checkbox"/> has been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).</p> <p>a. <input checked="" type="checkbox"/> is attached hereto.</p> <p>b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4).</p> <p>7. <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p>a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input type="checkbox"/> have been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p>d. <input type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).</p> <p>9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)). Attached to the English language translation of the International Application</p> <p><b>Items 11 to 20 below concern document(s) or information included:</b></p> <p>11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input checked="" type="checkbox"/> A FIRST preliminary amendment.</p> <p>14. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</p> <p>15. <input type="checkbox"/> A substitute specification.</p> <p>16. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.</p> <p>18. <input checked="" type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4).</p> <p>19. <input checked="" type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</p> <p>20. <input checked="" type="checkbox"/> Other items or information: International Search Report          International Preliminary Examination Report</p>					

U.S. APPLICATION NO. (if known, see 37 CFR 1.5) <div style="font-size: 2em; font-weight: bold; margin-top: 5px;">10/070300</div>		INTERNATIONAL APPLICATION NO. PCT/IB00/01246		ATTORNEY'S DOCKET NUMBER 16791-2	
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21. <input checked="" type="checkbox"/> The following fees are submitted: <b>BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):</b> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... <b>\$1040.00</b>  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... <b>\$890.00</b>  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... <b>\$740.00</b>  International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... <b>\$710.00</b>  International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) ..... <b>\$100.00</b>  <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>				<b>CALCULATIONS PTO USE ONLY</b>	
				\$	890
Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	\$	
Total claims	16 - 20 =	0	x <b>\$18.00</b>	\$	0
Independent claims	2 - 3 =	0	x <b>\$84.00</b>	\$	0
MULTIPLE DEPENDENT CLAIM(S) (if applicable)				\$	0
<b>TOTAL OF ABOVE CALCULATIONS =</b>				\$	890
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				\$	
<b>SUBTOTAL =</b>				\$	890
Processing fee of <b>\$130.00</b> for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
<b>TOTAL NATIONAL FEE =</b>				\$	890
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). <b>\$40.00</b> per property +				\$	
<b>TOTAL FEES ENCLOSED =</b>				\$	890
				Amount to be refunded:	\$
				charged:	\$

a. ☒ A check in the amount of \$ 890 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. \_\_\_\_\_ in the amount of \$ \_\_\_\_\_ to cover the above fees.  
 A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any  
 overpayment to Deposit Account No. 23-3030 (but not issue fees). A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card  
 information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

**NOTE:** Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR  
 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO.

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Clifford W. Browning  
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 NAME

32,201  
 \_\_\_\_\_  
 REGISTRATION NUMBER

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent ) BOX PCT  
application of: )  
)  
Vitale Bruzzo )  
)  
Corresponding to International Application )  
No. PCT/IB00/01246 )  
)  
Filed September 4, 2000 )  
)  
PROCEDURE AND DEVICE OF )  
COOLING BY ABSORPTION ) March 5, 2002

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents  
Washington, DC 20231

Sir:

As a Preliminary Amendment to the above-referenced Application, please enter the following amendments prior to computing the filing fees therefore.

**IN THE CLAIMS :**

**Please cancel claims 1-6 and insert in lieu thereof new claims 7-12 as follows:**

Express Mail Label No. EL916999709US

Date of Deposit: March 5, 2002

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR §1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, DC 20231.

*Sheryl K. Haterings*

Signature of person mailing paper or fee

7. A system for the production of cold by absorption comprising a generator (1), a condenser (2), an evaporator (7), an expansion valve (6), and an absorber (8), and a storing assembly of cooling liquid under pressure composed of at least one receiver (4), a valve (3) upstream of said receiver (4), and a valve (5) downstream of said receiver (4) characterised in that the upstream valve (3) is passing when the pressure upstream is greater than or equal to the pressure downstream and in that the downstream valve (5) is blocked when the generator stops producing vapour.

8. A system according to Claim 7, characterised in that the receiver (4) comprises a security valve (9).

9. A system according to Claim 7, characterised in that the assembly receiver (4), upstream valve (3), and downstream valve (5) are assembled so that these three elements cannot be disassembled.

10. A system according to Claim 7, characterised in that the upstream valve (3) is an electrovalve.

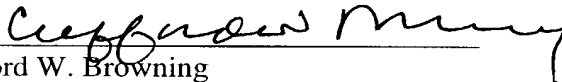
11. A method for producing cold by absorption comprising the following stages :  
 - heating of a mixture coolant-absorbent until the evaporation of the coolant in a boiler (1),  
 - condensation of the coolant vapours in liquid form in a condenser (2),  
 - expansion of the coolant under pressure in an evaporator (7),  
 - absorption of the expanded coolant with the absorbent in the absorber (8),  
 - storing of the coolant in liquid form in a receiver (4) placed between the condenser (2) and the evaporator (7) ;

characterised in that it comprises also the stages of :

- opening of a downstream valve (5) when the desired production of cold is reached, the receiver turning the liquid under pressure into the evaporator (7) to produce cold
- opening of an upstream valve (3) only when the pressure at the exit of the condenser (2) is higher than the pressure inside the receiver (4)
- closing of the downstream valve (5) when the boiler no longer produces vapour.

12. A method according to Claim 11, characterised in that the downstream valve (5) is closed a little time before the stopping of vapour production, the suppression of cooling liquid thus produced being accumulated in the receiver (4).

Respectfully submitted,

By:   
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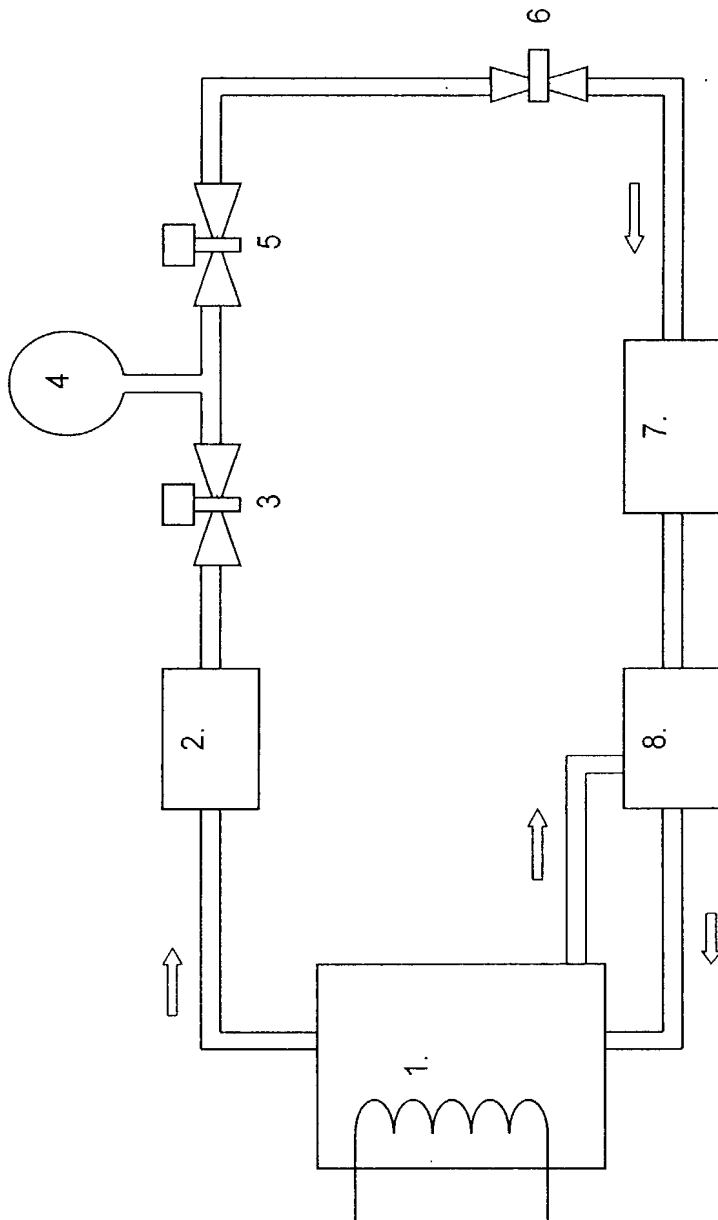


Fig. 1

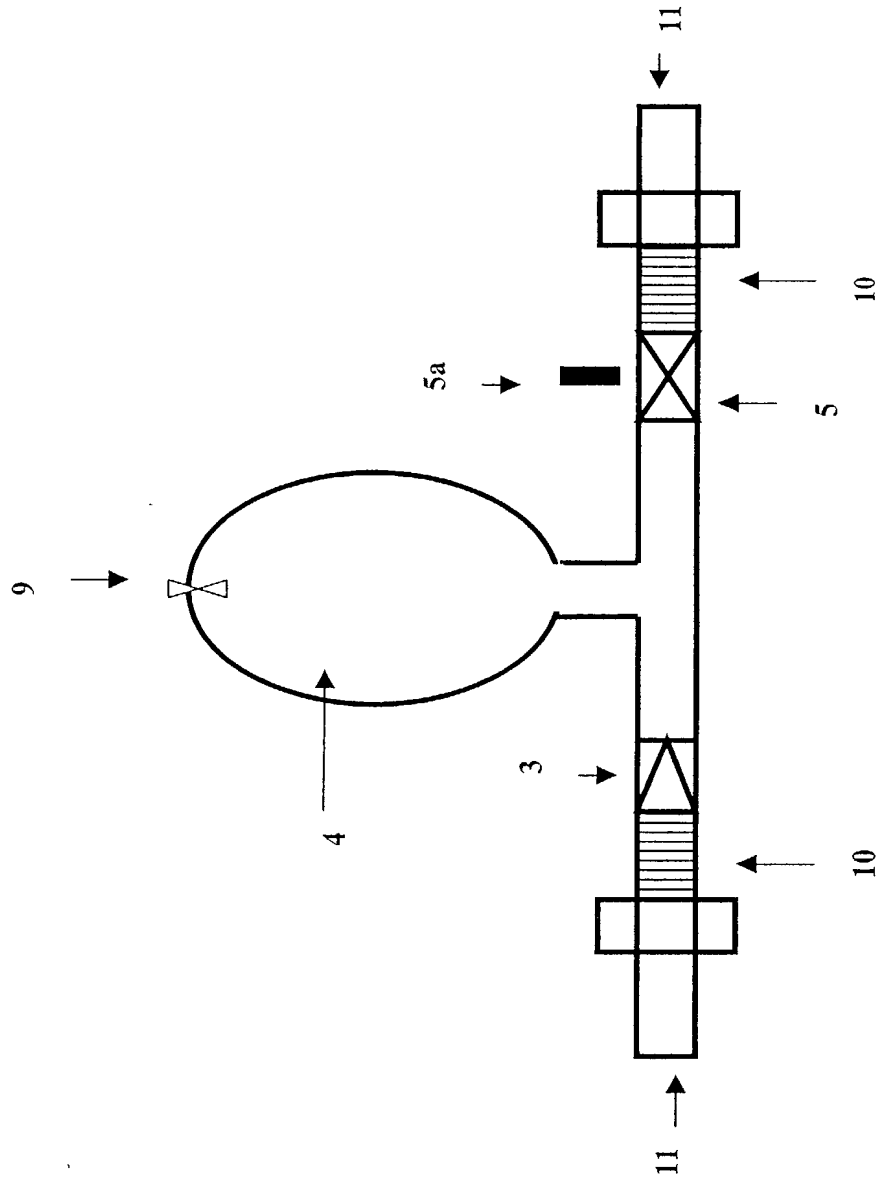


Fig. 2

## A PROCEDURE AND DEVICE OF COOLING BY ABSORPTION

The present invention concerns a procedure and device for the production of cold by absorption, and more particularly a procedure and a device for the acceleration of the starting of cooling processes.

A cooling system by absorption comprises schematically a generator, an evaporator, and a condenser. To function, the generator is filled with a mixture of at least two mixable substances, from now on referred to as binary mixture (a coolant and an absorbent). This mixture is combined in an absorber in which the absorption of the coolant by the absorbent takes place. The coolant and the absorbent must have an evaporation pressure sufficiently different in order to, when the generator is heated, the most volatile of the two, be it the coolant, evaporates and transforms itself into a liquid in the condenser.

The absorption system normally includes a pump to return the binary mixture of the absorber towards the generator. The vapours pass through the condenser that condenses them in a liquid, which is taken towards the expansion valve of the evaporator for the desired cooling effect.

This principle being based on the heating of the binary mixture, the starting process is relatively slow. In fact, the temperature of the binary mixture has to be risen to several tens of degrees before becoming vapour. While the vapour is not produced the cooling function remains without effect.

Such a device, according to the preamble of Claim 1, is described in the document DE 28 56 767 A.

The objective of the present invention is to allow the production of cold by such a system from the starting of the cooling system.

This objective is achieved by a storing device of the coolant under pressure in a receiver supplied to this effect, and by a control of access to said receiver by means of two valves.

According to the invention the mixture under pressure is accumulated in a receiver during the normal functioning of the cooling system. Once the system is stopped this coolant under pressure is stored in the receiver thanks to a closing of the valves upstream and downstream of the receiver. The latter is then isolated from the cooling circuit and conserves thus the coolant under pressure.

From the starting of the cooling system this pressure will be used to feed coolant liquid under pressure the cooling circuit and thus to immediately produce cold. To this effect the valve downstream towards the evaporator will be open while the valve upstream of the condenser side is kept closed. The latter remains closed as long as the pressure at the exit of the condenser is lower than that in the receiver.

Once the process of vapour production is operational the valve upstream lets pass the coolant under pressure which on the one hand will feed the evaporator and on the other hand will fill the receiver for a next use.

The invention will be better understood with the help of the following detailed description referring to the annexed figures which are given as a non-limiting example, in which:

- Figure 1 represents the storing device of the coolant under pressure
- Figure 2 represents a monoblock embodiment.

In Figure 1 the generator 1 uses as an energy source a resistor. The mixture coolant-absorbent is heated and the most volatile of the two components, be it the coolant, is transformed into vapour. These vapours are condensed in a liquid in the condenser 2. The liquid under pressure then arrives in the valve upstream 3 of the receiver 4 that allows to access the receiver 4. This upstream valve 3 can for example be commanded electrically by a device that measures the different pressures. It can also be a differential valve that opens when the

pressure upstream exceeds the pressure downstream. It then works as an anti-return valve.

Downstream of the receiver 4 a second valve 5 is necessary for the functioning of the assembly. This valve is generally commanded by the feeding of the system. When the cooling system is interrupted it is immediately closed in order to keep the pressure in the receiver 4. In the same way when the system is locked it opens so that the coolant under pressure can feed the evaporator 7 by the expansion valve 6.

The coolant is then taken into the absorber 8 that mixes it with the absorbent to be re-injected in the generator 1.

The heat generated in the generator 1 can have different origins. According to the representation of Figure 1, it can be of electric origin or it can come from other heat sources, for example from the exhaust gases of a combustion engine.

According to one embodiment it is possible to add a supplementary valve for the access to the receiver in order to not slow down the starting of the process in the case where the receiver is empty. This valve only opens when the system produces enough liquid under pressure in order to be able to store a part in said receiver.

According to a particular embodiment of the invention it is possible during the stopping of the cooling system to close the downstream valve 5 before stopping the vapour production. In this way a suppression is produced in the condenser 2 which will be stored in the receiver 4. When the desired pressure is achieved the generator 1 is started. This suppression accumulated in the receiver 4 will be able to produce longer cold until a next re-starting of the system.

To satisfy security criteria a monoblock embodiment of the assembly is proposed such as illustrated in Figure 2. This assembly is composed of a

receiver 4 with its wall not welded, moulded in one piece in a material resistant to ammonia. Furthermore, it is sized to support a pressure of 50 atmospheres.

As indicated above this assembly is equipped with a non-return valve upstream 3, an electrovalve downstream 5, as well as a security valve 9 calibrated at 40 atmospheres. The three elements: non-return valve, electrovalve, and security valve are parts of the assembly and cannot be replaced individually.

From this fact the replacement of the receiver assembly may be done without danger even if in the receiver the ammonia under pressure remains. Only the coil 5 a of the electrovalve 5 can be replaced individually.

The two ends of the tube 10 are either welded or connected by means of two conical connectors with deformable joints 11.

The proposed assembly can have different shapes and sizes following the vehicle or machine on which it is assembled.

In certain cases the non-return valve 3 is replaced by an electrovalve.

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## CLAIMS

1. A system for producing cold by absorption consisting of a generator (1), a condenser (2), an evaporator (7), an expansion valve (6) and an absorber (8), characterized in that it includes an assembly for storing liquid refrigerant under pressure composed of at least a reservoir (4), a valve (3) upstream of the said reservoir (4) and a valve (5) downstream of the said reservoir (4).
2. A system according to claim 1, where the upstream valve (3) is open as soon as the upstream pressure is greater than or equal to the downstream pressure.
3. A system according to claims 1 or 2, where the downstream valve (5) is blocked as soon as the generator ceases to produce vapour.
4. A system according to claims 1 to 3, where the reservoir (4) includes a safety valve (9).
5. A system according to claims 1 to 4, where the assembly of the reservoir (4), upstream valve (3) and downstream valve (5) are mounted in such a way that these three elements cannot be dismantled.
6. A method for producing cold by absorption consisting of the following steps:
  - heating a refrigerant-absorbent mixture in a boiler (1) until the refrigerant evaporates,
  - condensation of the refrigerant vapours in liquid form in a condenser (2),
  - expanding the refrigerant under pressure in an evaporator (7),
  - absorption of the expanded refrigerant by the absorbent in the absorber (8), characterized by the additional stages of:
    - storage of the refrigerant in liquid form in a reservoir (4) situated between the condenser (2) and the evaporator (7),
    - opening of a downstream valve (5) once the production of cold is desired, the reservoir discharging the liquid under pressure into the evaporator (7) in order to produce cold,
    - opening of an upstream valve (3) uniquely when the pressure at the outlet of condenser (2) is greater than the pressure in the reservoir (4),

**TRANSLATION FROM FRENCH**  
**Ref. 02652**

- closing of the downstream valve (5) as soon as the boiler no longer produces vapour.

7. A method according to claim 6 where the downstream valve (5) is closed just before stopping the production of vapour, the overpressure of the liquid refrigerant thus generated being accumulated in the reservoir (4).

**ABSTRACT**

When using systems that use the principle of absorption for the production of cold there is a great delay between the starting of the installation and the production of cold. This delay is due to the necessary time for the production of vapour.

According to the invention a storing device of cooling liquid under pressure is proposed that is used instead of the vapours produced by a boiler (1) when starting the installation. This storing is done in a receiver (4) commanded by two valves, one called upstream valve (3) and the other called downstream valve (5).

According to the invention the method consists in storing cooling liquid under pressure in a receiver and using this liquid under pressure when starting the installation.

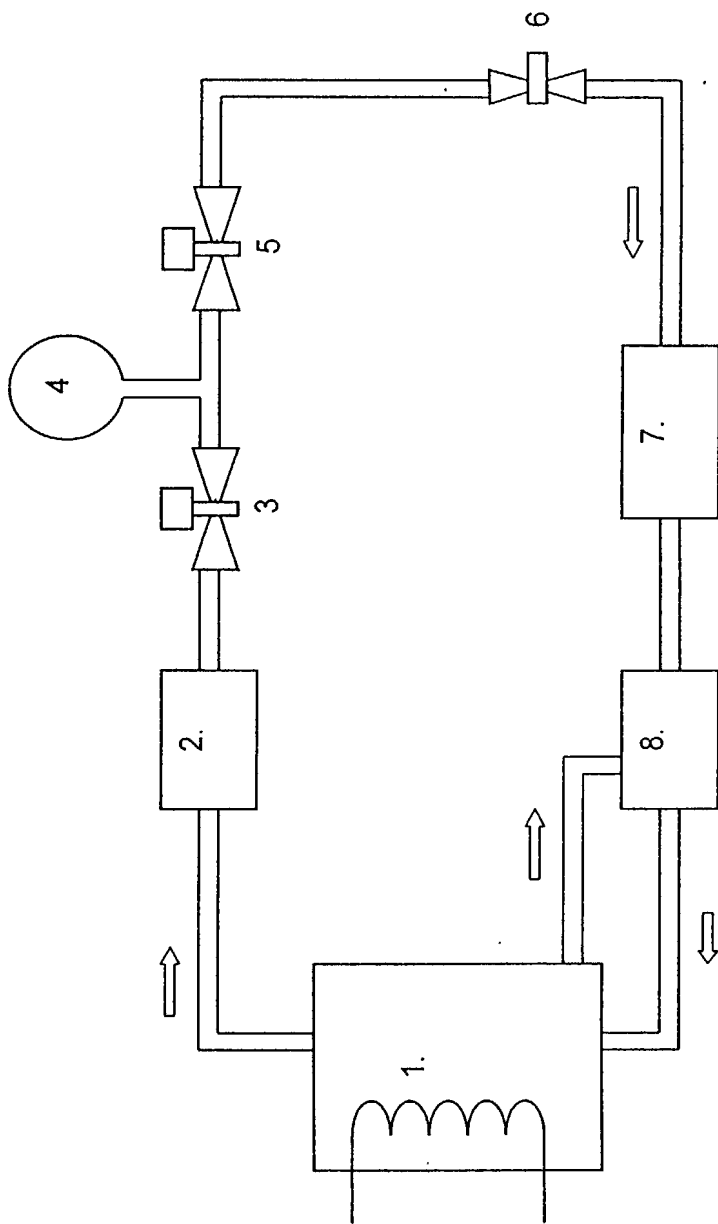


Fig. 1

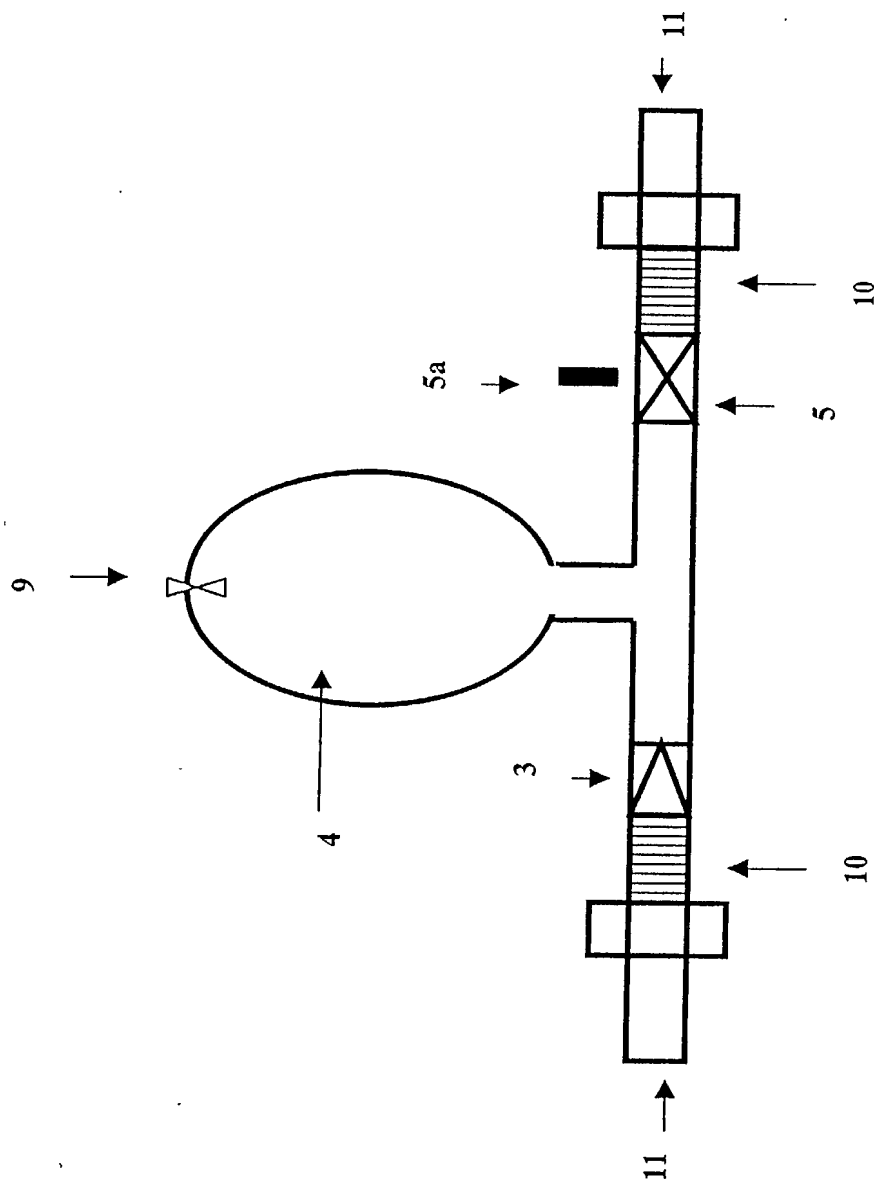


Fig. 2



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B-271-314-PCT-US

**DECLARATION AND  
POWER OF ATTORNEY FOR PATENT APPLICATION**

Docket No. 16791-2

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**A COMBUSTION GAS DEPOLLUTION PROCEDURE AND DEVICE,**

the specification of which

- (check one) ☐ is attached hereto.  
☐ was filed on \_\_\_\_\_ as Application Serial No. \_\_\_\_\_  
and was amended on \_\_\_\_\_ (if applicable).  
☐ was filed as PCT International Application No. PCT/IB00/01245 and  
was amended under PCT Article 19 on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) on which priority is claimed:

Prior Foreign/PCT Application(s)

Priority Claimed

99810805.4  
(Application No.)EP  
(Country/PCT)08/09/99  
(Day/Month/Year Filed)☐ Yes  
☐ No

I hereby claim the benefit under Title 35, United States code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:

## Prior U.S./PCT Applications:

(U.S. Application Serial No.)	(U.S. Filing Date)	(Status-patented/pending/abandoned)
(U.S. Application Serial No.)	(U.S. Filing Date)	(Status-patented/pending/abandoned)
(PCT Application No.)	(U.S. Filing Date)	(U.S. Serial No. Assigned, if any)
(PCT Application No.)	(U.S. Filing Date)	(U.S. Serial No. Assigned, if any)

I hereby declare that all statement made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: Harold R. Woodard, No. 16214; C. David Emhardt, No. 18,483; Joseph A. Naughton Jr., No. 19,814; John V. Moriarty, No. 26,207; John C. McNett, No. 25,533; Thomas Q. Henry, No. 28,309; James M. Durlacher, No. 28,840; Charles R. Reeves, No. 28,750; Vincent O. Wagner, No. 29,596; Steve Zlatos, No. 30,123; Spiro Bereveskos, No. 30,821; Clifford W. Browning, No. 32,201; R. Randall Frisk, No. 32,221; Daniel J. Lueders, No. 32,581; and Kenneth A. Gandy, No. 33,386.

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Full name of sole or first inventor:

Vitale BRUZZO

Inventor's Signature:

Date

14-03-2002

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Country of Citizenship

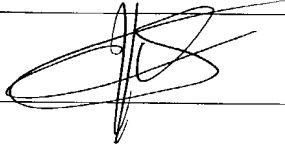
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Full name of second joint inventor, if any:

Inventor's Signature:



Date

11-03-2002

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